TELERIDER IMPACT STUDY

Computerized Information on Public Transit Service

Performed for the

Ontario Ministry of Energy

by the Ottawa-Carleton Regional Transit Commission

INTRODUCTION

Ontario obtains virtually all of its crude oil from outside the province at an annual cost to the provincial economy of close to $7 billion. The Ontario government has introduced a policy to decrease dependence on crude oil to make the province less vulnerable to price changes and to supply problems.

The transportation sector is one of the major consumers of crude oil in the province. Approximately one half of all oil consumed is used for transportation, and of that, private automobiles in urban areas account for about one third.

Public transit can be a much more energy and cost-efficient means of transporting people than the private car. In keeping with its policy to decrease oil consumption, the provincial government encourages greater use of public transportation facilities.

Transit authorities have traditionally increased ridership by expanding the capacity of the transit service. This approach, however, has two shortcomings: it requires considerable capital investment and it does not solve the problem of underutilization during off-peak times.

Table 1

RIDERSHIP CHANGES IN TEST AND CONTROL COMMUNITIES

(APRIL 1980 - JANUARY 1981)

	KANATA PASSENGERS				BLACKBURN PASSENGERS			
	Before	After	Change	%	Before	After	Change	%
Peak	522	576	+ 54	+10.3	1074	1247	+173	+16.1
Midday	105	171	+ 66	+62.9	161	273	+112	+69.6
Evening	52	39	- 13	-25.0	95	119	+ 24	+25.3
TOTAL	679	786	+107	+15.8	1330	1639	+309	+23.2

	PASS/HOUSEHOLD				PASS/HOUSEHOLD			
	Before	After	Change	%	Before	After	Change	%
Peak	0.1783	0.1966	+.0183	+10.3	0.3728	0.4327	+.0599	+16.1
Midday	0.0358	0.0583	+.0225	+62.9	0.0558	0.0947	+.0389	+69.6
Evening	0.0177	0.0133	-.0044	-25.0	0.0329	0.0412	+.0129	+25.3
TOTAL	0.2318	0.2682	+.0364	+15.8	0.4615	0.5686	+.1116	+23.2

Table 2

AVERAGE DAILY RIDERSHIP CHANGES

ON SELECTED ROUTES

	NON "560" AREA			"560" AREA		
Time Period	Sept Nov	Feb Mar	% Change	Sept Nov	Feb Mar	% Change
04:00 06:30	288	307	+ 6.6	485	618	+ 27.4
06:31 09:30	6007	6170	+ 2.7	9535	9645	+ 1.2
09:31 15:30	5598	5272	- 5.9	5204	5546	+ 6.6
15:31 18:30	4280	4461	+ 4.2	5923	5382	- 9.1
18:31 02:00	3491	3060	-12.4	2467	2958	+ 19.9
Total Peak	10287	10631	+ 3.3	15458	15027	- 2.8
Total Off-Peak	9377	8639	- 7.9	8156	9122	+ 11.8
TOTAL DAY	19664	19270	- 2.1	23614	24149	+ 2.3

Table 3

ESTIMATION OF RIDERSHIP INCREASE DUE TO

TELERIDER IN TEST AREA

Period	Estimated Ridership in 560 area without Telerider 560	Actual Ridership	Difference
peak	$15458 \times \frac{10631}{10287} = 15975$	15027	948* (-6.1%)
off-peak	$8156 \times \frac{8638}{9377} = 7514$	9122	660** (+8.1%)
TOTAL	23489	24149	660 (+2.8%)

* It is assumed that these riders shifted from peak to the off-peak, once waiting times were known.

** This is a net figure, after riders who shifted from the peak to the non-peak are subtracted.

This report summarizes the results of one phase of the Ottawa-Carleton Regional Transit Commission's (OC Transpo) efforts to increase ridership during off-peak hours without expanding the transit system. OC Transpo's program consisted of a comprehensive information program to encourage people to use public transit during off-peak times. The program was funded by the Ontario Ministry of Transportation and Communications Transit Demonstration Program.

One part of this program was the implementation of the Telerider "560" system -- a computerized information system giving transit users access to precise scheduled arrival times at their local bus stop. The Ontario Ministry of Energy commissioned an analysis of Telerider 560 to determine the impact on ridership and the potential energy savings.

COMPUTERIZED TRANSIT INFORMATION

The computerized transit information system installed by OC Transpo allows transit users to phone in to a computer and receive information on the scheduled arrival times of the buses serving their stop.

To gain access to the information, the user dials 560 plus a 4-digit number that is posted at his local bus stop. The four-digit numbers are also provided on a map which is mailed to the home. After dialing, a computerized voice announces the number of minutes until the scheduled arrival time of the next two buses.

The 4-digit stop numbers are shared among three or four consecutive stops, provided the stops serve the same route and are within two minutes bus running time of each other. The computer also provides route status information concerning delays and notice of irregular service or cancellation. Special messages include up to 10 days advance warning of route changes and of fare changes. The messages are in French and English. The language that is spoken first is governed by the dominant tongue in the neighbourhood.

A typical message, after the passenger had dialed 560 and the number appearing at his stop, would be "OC Transpo schedule for stop 8585. Next route 52 buses in 2 and 17 minutes; next route 56 buses in 3 and 23 minutes; next route 59 buses in 6 and 16 minutes."

The hourly capacity of the 560 system is 10 to 15 times greater than the conventional telephone inquiry service. With the installation of Telerider, the load on the conventional inquiry service in the test area was greatly reduced because up to 40 per cent of queries are traditionally for schedule information. In addition, the computer system operates 24 hours a day, seven days a week, while the conventional inquiry system operates only 16 hours a day, 7 days a week.

The Ottawa-Carleton Regional Transit Commission

OC Transpo is the transit authority for the Regional Municipality of Ottawa-Carleton. The area served comprises five cities (including Ottawa), one village and the urbanized portion of one township.

OC Transpo, which currently provides more than 77 million rides annually, has one of the highest levels of transit ridership per capita in North America. Between 1971 and 1981, ridership more than doubled from 35.5 million to 76.8 million rides and annual per capita ridership increased from 99 to approximately 156.

The high per capita ridership is a result of the application of innovative services as well as an expansion of the transit capacity during the past ten years. Such innovations as dial-a-bus, express routes, exclusive bus lanes, contra-flow lanes, promotion of flexible working hours, new methods of fare collection and new scheduling techniques were introduced by the transit authority.

The rapid growth rate in ridership experienced in the 1970's (10 to 12 per cent per year), however, had declined to 3 per cent by 1980. In response to both financial and energy pressures, OC Transpo initiated a comprehensive information program in late 1979 to increase ridership through intensifying the use of existing facilities rather than through further expansion of capacity.

The information program was formulated to encourage people who were using private cars during off-peak hours to switch to public transit.

Transit Productivity and Energy Conservation

Public transit has several advantages over the private car as a means of transportation. It can be much more energy-efficient. A bus carrying 40 passengers consumes less energy per passenger than a car carrying one person -- 1.4 litres per 100 passenger-kilometres (200 passenger miles per gallon) versus 14.1 litres per 100 passenger-kilometres (20 passenger miles per gallon). A public transit system also minimizes traffic congestion, and air pollution as well as the investment required for facilities such as roadways.

One of the major efficiency problems with public transportation is the marked ridership imbalance between peak and off-peak times (peak times are between 6:30 and 9:30 a.m. and 3:30 to 6:30 p.m.). Typically, in medium and large urban areas, between ten and 12 per cent of all travel occurs in the peak hours. Much of the service capacity (including personnel and equipment), which is required to carry passengers during peak times, either lies idle or is underutilized during off-peak hours.

Although the introduction of such innovations as flexible working hours can alleviate the peak hour problem, use of public transit continues to be heavily concentrated during rush hours.

OC Transpo increased its ridership from 1971 to 1981 by expanding its passenger-carrying capacity and by upgrading its services. The addition of 39 million passengers to the system during this period (most of whom would otherwise have used private cars) resulted in a savings of approximately 50 million litres of gasoline in 1980. At the same time, only about 15 million more litres of diesel fuel were consumed by OC Transpo's vehicles, providing an overall savings of approximately 35 million litres of transportation fuel.

One indicator of a transit system's effectiveness is the number of revenue vehicle kilometres operated. Another indicator is ridership per capita -- the more people using a transit system, (with constant population), the more effectively the system is operated.

Although OC Transpo's per capita ridership grew by 53 per cent during the 1970's, the actual efficiency of the system -- measured by the average vehicle occupancy -- barely changed. The number of passenger kilometres per vehicle kilometre dropped from 14.18 to 13.84. The 210 per cent increase in the number of passengers carried was thus achieved by providing an equal increase in service.

An increase in occupancy, not just in ridership, would have resulted in a greater energy saving. If, for example, average occupancy had increased from 27 per cent (an average occupancy for transit in North America) to 33 per cent, a further 17 million litres of petroleum fuel could have been saved annually. This saving would have occurred without an increase in the amount of diesel fuel consumed by OC Transpo vehicles.

OC Transpo decided, in 1979, to concentrate on increasing ridership during off-peak times to raise the average vehicle occupancy. After careful consideration, the transit authority decided the best way to achieve this goal was to implement a comprehensive information service to encourage more people to take transit during off-peak times.

RIDERSHIP AND INFORMATION

Before the Telerider project was initiated, 41 per cent of the people travelling at peak hours in the area served by OC Transpo used public transit, while only 20 per cent of those travelling in off-peak hours did the same.

If this off-peak modal split could be increased from 20 per cent to 30 per cent, the overall ratio of farebox revenue to operating cost for OC Transpo would rise from about 56 per cent to almost 67 per cent. At the same time, overall occupancy would increase from 27 to 32 per cent.

OC Transpo realized, however, that there were a number of obstacles to increasing ridership in off-peak hours. Service is generally infrequent during these times; more transferring is usually required; and the trips are often slow and meandering (there are few express trips). The user, who is seldom travelling to work, is much more likely to be travelling to more than one location. Since many of the trips are unfamiliar, the passenger's knowledge of the service tends to be relatively poor. Also, traffic congestion is not as much of a problem during off-peak times and more parking space is available, making the use of a car more convenient than during rush hour periods.

Peak service, on the other hand, is characterized by high frequency, direct and, if express services are provided, faster service. The typical user is a commuter who is usually very knowledgeable about his particular transit trip.

An improved information service seemed to be the best way to solve many of the off-peak travel problems. However, a simple expansion of the existing information had its limitations.

Just increasing the number of printed schedules and maps is of limited value to the non-habitual transit rider. Information in this form is frequently not easily available at the time the travel decision is made; the schedule and map may not be up-to-date; and schedules and maps are often difficult to understand. Most people who have a choice of travel mode will not subject themselves to this uncertainty.

If the off-peak rider could have up-to-date schedule and status information for his chosen bus stop at his finger tips and be sure that he is boarding the right bus, the problem of the uncertain wait would be removed. Long periods of time between busses would be less of a disadvantage and one of the most powerful deterrents to off-peak riding could be eliminated.

An electronic information system was chosen as the most appropriate solution because it could respond quickly to schedule alterations due to changing weather conditions, accidents, heavy traffic and equipment failures. Printed schedules, on the other hand, take three to five weeks to print and distribute. The Telerider automated system also had the advantage of being available in the passenger's home rather than at a bus stop.

IMPACT OF COMPUTERIZED SCHEDULE INFORMATION SYSTEM

Method

To measure the impact of Telerider, a test area -- Blackburn Hamlet -- and a similar "control" area -- Beaverbrook in Kanata -- were chosen for comparison. Both areas are bedroom communities with approximately 3,000 homes and are located several kilometeres from Ottawa's downtown core.

Ridership growth was also compared for routes completely within the test area to ridership growth, on similar routes, completely outside the test area.

Passengers were counted, in both the 560 area and in the control area, before and after the installation of the information system, with electronic passenger counters. Forty-seven of OC Transpo's buses were equipped with the counters. For the study, the buses were rotated so that counts were made on every route once during each 3-month period. Counts of passengers boarding and leaving the buses in addition to fare counts, pass surveys and spot counts provided a fairly accurate picture of ridership patterns.

Prior to the impact study, both Blackburn Hamlet and Beaverbrook received special mailings. The Blackburn mailing contained information about the 560 system and Beaverbrook received general promotional literature about public transit. This was done to off-set any ridership increase in the 560 area that might be due only to the introductory literature.

Between April 1980 and January 1981, the increase in ridership in the Telerider test area was greater for each time period -- peak, midday and evening -- than in the control area. As usually happens in winter, evening ridership in Kanata declined by 25 per cent. However, evening ridership actually increased by 25 per cent in Blackburn. The percentage increase in ridership on midday trips was 7 per cent more in the Telerider area than in the control area, and 6 per cent more for peak hour trips.

There was an overall increase in Blackburn from 462 to 569 passengers per 1,000 households and in Kanata from 232 to 268 passengers per 1,000 households.

As Table 2 indicates, overall ridership declined in the non-Telerider test routes by 2.1 per cent during the test period. The Telerider routes showed an increase of 2.3 per cent.

If the ridership changes observed in the non-560 area (Kanata) represent the normal trend for the time of year analysed, expected ridership changes due to Telerider can be estimated for the 560 area (Blackburn). The differences between the expected ridership changes without Telerider and the observed ridership changes can be assumed to result from the introduction of the Telerider 560 system. The ridership increase due to Telerider is estimated at 2.8 per cent overall and 8.1 per cent in the off-peak times (see Table 3). Some shift of ridership from peak periods to off-peak also occurred.

At this level of usage and on an annual basis, area-wide application of 560 service could be expected to generate 2.6 million off-peak rides. Assuming normal automobile occupancies and trip lengths, and assuming that all these riders would otherwise be using cars, this increased transit ridership translates into a fuel saving of about 2.7 million litres.

CONCLUSIONS

A computerized schedule information system such as the Ottawa-Carleton 560 system can substantially increase transit ridership, particularly in off-peak hours when the capacity is generally available. It can also increase ridership without increasing the consumption of transit fuel.

If additional riders would otherwise be using automobiles, with a 1.5 occupancy rate, the ridership impact over the whole transit area served by OC Transpo would reduce fuel consumption by 2.7 million litres annually.

The computerized transit schedule system was well received by the public in Ottawa-Carleton. Ninety-one per cent of the people interviewed who had used the system found it effective. Eighty-two per cent of the households surveyed knew about the service.

The Telerider experiment was so successful that OC Transpo has extended the service to the rest of the Regional Municipality of Ottawa-Carleton.

One of the key objectives of the Government of Ontario's energy conservation program is to stimulate the use of more energy-efficient modes of transportation such as transit. This analysis suggests that the implementation of computerized schedule information systems such as the Telerider system can help achieve this objective by making transit travel more attractive to off-peak travellers.

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